

NASA TECH BRIEF

Langley Research Center



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the National Technical Information Service, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Office, NASA, Code KT, Washington, D.C. 20546.

Battery Cell Thermal-Conductive Coating Increases Efficiency

Applying a thin coating of high-temperature epoxy resin (containing an aluminum-oxide filler) to battery cells provides the necessary electrical insulation, as well as good thermal conductivity between the cells. This insulation increases the efficiency of a nickel-cadmium battery, as it would any multicell battery assembly in which cell-to-cell thermal balance is critical.

With this thermally conductive coating, the efficiency of the battery was 23% greater than with the best alternative method tested. This improvement was obtained even though the primary heat transfer surface was the cell base, which was heat sunk to a plate in the center of the battery. A battery designed for more uniform heat rejection over the cell surfaces should have much greater thermal efficiency.

To prepare battery cells using this method, a thin 0.05- to 0.76-mm (2- to 3-mil) film of high-temperature, aluminum-oxide-filled epoxy resin is applied to each cell, to provide the electrical resistance required to prevent shorting and to provide a thermally conductive path between cells to reduce the temperature difference to 0.6° C (1° F).

The resin used (Stycast 2850FT or equivalent) has a thermal conductance of 14 watt-cm/m²-K (10 BTU-in./ft²-hr-°F) and an electrical resistance of 10¹⁴ ohm-cm. The coating is applied by dipping each cell into the solution that has been heated to 66° C (150° F). The

cells are rotated, to maintain a uniform coating thickness, until gel is achieved. Then they are cured for four hours at 74° C (165° F) and for two hours at 100° C (212° F).

Note:

No further documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
Langley Research Center
Mail Stop 139-A
Hampton, Virginia 23665
Reference: B73-10237

Patent status:

Inquiries concerning rights for the commercial use of this invention should be addressed to:

Patent Counsel
Langley Research Center
Code 456
Hampton, Virginia 23665

Source: H. M. Doyle of
Martin Marietta Corp.
under contract to
Langley Research Center
(LAR-10963)

Category 01, 08